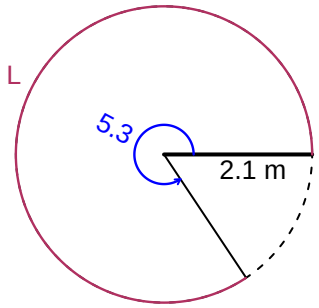
Name: Date:

Trig Final (SLTN v673)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 5.3 radians. The radius is 2.1 meters. How long is the arc in meters?

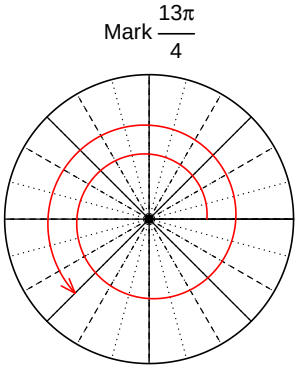


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

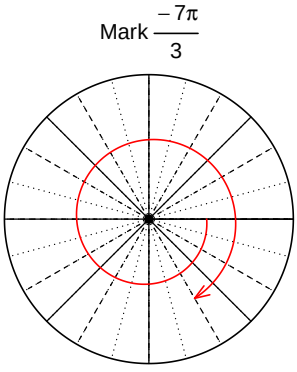
$L = 11.13$ meters.

Question 2

Consider angles $\frac{13\pi}{4}$ and $\frac{-7\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{13\pi}{4}\right)$ and $\cos\left(\frac{-7\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\sin(13\pi/4)$



Find $\cos(-7\pi/3)$

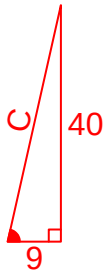
$\sin(13\pi/4) = \frac{-\sqrt{2}}{2}$

$\cos(-7\pi/3) = \frac{1}{2}$

Question 3

If $\tan(\theta) = \frac{40}{9}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

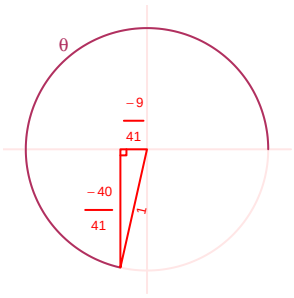
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$9^2 + 40^2 = C^2$$
$$C = \sqrt{9^2 + 40^2}$$
$$C = 41$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-9}{41}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 6.76 Hz, an amplitude of 3.39 meters, and a midline at $y = -2.38$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -3.39\sin(2\pi 6.76t) - 2.38$$

or

$$y = -3.39\sin(13.52\pi t) - 2.38$$

or

$$y = -3.39\sin(42.47t) - 2.38$$